Chloride diffusion coefficient of concrete in the Arabian Gulf environment

Sharif A., Azad A.K., Navaz C.M., Loughlin K.F.

Arabian Journal for Science and Engineering
Vol. 22, Issue.2B, 1997

Abstract: This investigation evaluates the chloride diffusion coefficient for concrete made with marginal limestone aggregates and Type V Portland cement commonly used in the Arabian Gulf. Parameters investigated are (1) water-cement ratio, (2) cement content, (3) surface chloride concentration, and (4) exposure condition. An attempt is made to arrive at a model for predicting the onset of corrosion using the limited test data. The experimental results revealed that the chloride diffusion coefficient is strongly influenced by water-cement ratio and exposure conditions and marginally by cement content but unaffected by the surface chloride concentration. The chloride diffusion coefficient values ranged from (8 to 170) x 10-8 cm2/sec for different concrete mixes and exposure conditions. The high value of the chloride diffusion coefficient is mainly attributed to the low concrete quality and the local aggressive environmental conditions. The basis of the prediction model to corrosion initiation has been set and reasonable results are produced based on the limited experimental data.